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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Shuichi ICHIKAWA et al.

Group Art Unit: 2855

Application No.: 10/505,334

Examiner: G. VERBITSKY

Filed: August 23, 2004

Docket No.: 120868

For: METHOD OF MEASURING THERMAL CONDUCTIVITY OF HONEYCOMB
STRUCTURE

REPLY BRIEF

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The following remarks are directed to the new points of argument raised in the Examiner's Answer dated April 3, 2008. As explained in detail below, the Examiner's Answer continues to unreasonably combine features of the applied references without the requisite articulated reasoning and rational underpinning to support a conclusion of obviousness. Appellants respectfully submit that the Examiner's Answer improperly combines features that would not have been obvious, or arrived at with a reasonable expectation of success, based on the disclosures of the references or any objective evidence of record.

Accordingly, this Honorable Board should reverse the rejections of claims 13, 16-18, 22, 24 and 25.

A. One of Ordinary Skill in the Art Would Not Have Had a Reasonable Expectation of Success in Combining U.S. Patent No. 5,693,685 to Kishimoto et al. (Kishimoto) and U.S. Patent No. 6,331,075 to Amer et al. (Amer) in the Manner Suggested

The Examiner's Answer improperly maintains that the present subject matter would have been obvious over Kishimoto and Amer by failing to consider all of the recited claim features, as a whole, and disregarding the significant differences between the applied references. Contrary to the assertions of the Examiner's Answer, the relied-upon portions of Amer would not have logically commended themselves to one of ordinary skill in the art looking to modify the alleged method of Kishimoto, and would not have lead to the specific combination of features recited in the pending claims with a reasonable expectation of success, or otherwise.

The Examiner's Answer contends that Kishimoto teaches a honeycomb structure/device in Fig. 1. The Office Action refers to col. 13, lines 9-15 of Kishimoto as allegedly teaching that the thermal conductivity of the thermal insulator depicted in Fig. 1 is determined and that "sides of the honeycomb structure are covered with a heat-insulating material (container) 1." The Examiner's Answer concedes that Kishimoto does not teach the particular method for determining thermal conductivity, as recited in the pending claims. The Examiner's Answer relies on Amer as allegedly remedying these shortfalls in Kishimoto.

Amer is specifically directed to a method for measuring the thermal conductivity of thin films between 50 μm and 150 μm thick (see Abstract). The Examiner's Answer asserts that it would have been obvious to one of ordinary skill in the art to apply the method taught by Amer, "to measure a thermal conductivity of a structure of Kishimoto, so as to provide the honeycomb structure with a conduction path through the honeycomb structure, as very well known in the art, and thus, obtaining data how the structure conducts heat." The analysis of the Examiner's Answer fails for at least the following reasons.

1. Kishimoto Does Not Disclose the Relied Upon Features

The Examiner's Answer asserts that Kishimoto allegedly teaches that "sides of the honeycomb structure are covered with a heat-insulating material (container) 1." This assertion is incorrect as applied to the subject matter of the pending claims.

Claim 18 recites, among other features, a method for measurement of thermal conductivity of a honeycomb structure, the method comprising the steps of contacting two ends of the honeycomb structure with contact members; covering exposed sides of the honeycomb structure with heat-insulating material; and measuring a thermal conductivity of the honeycomb structure in a steady state with contact members.

Appellants maintain, as argued previously, that the Examiner is unreasonably interpreting the closed-cell structure of Kishimoto to correspond to a honeycomb structure, contrary to the ordinary and customary meaning of a "honeycomb structure." In this regard, the Examiner's Answer asserts that a honeycomb structure is allegedly broadly defined as a cellular structure, based on an incomplete reference, or paraphrasing, of a dictionary definition. However, this assertion unreasonably focuses on only parts of a definition, without consideration of the definition as a whole, and as the term would be understood by one of ordinary skill in the art. As noted by the Federal Circuit, "one need not arbitrarily pick and choose from the various accepted definitions of a word to decide which meaning was intended as the word is used in a given claim. The subject matter, context, etc., will more often than not lead to the correct conclusion." *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998).

As used in the claims, and throughout the specification, one of ordinary skill in the art would understand the claims to be directed to honeycomb structures, such as those used for particulate filters. As described in Appellants' specification, and known in the art,

honeycomb structures have through-holes, or perforations, defined by partition walls. The closed-celled foam in Kishimoto does not reasonably correspond to such structures.

Likewise, it is unreasonable to assert, as the Examiner does on page 7, that "inhomogeneous" materials, as in Amer, correspond to honeycomb structures because they are "in a broad sense, somewhat cellular" and/or porous. Extending the disclosures of either or both of Amer and Kishimoto to cover the claimed structures is (1) unreasonable, (2) unsupportable based on the positive disclosures in the references, and (3) strains any broadest reasonable construction of either the subject matter of the pending claims or the teachings of the applied references.

Moreover, even under the Examiner's interpretation, Kishimoto does not disclose measuring a thermal conductivity of a honeycomb structure and covering exposed sides of the honeycomb structure with heat-insulating material. The container 1, depicted in Fig. 1 of Kishimoto, cannot reasonably be considered to correspond to covering exposed sides of "the honeycomb structure" with heat-insulating material, as recited in claim 18, at least because Kishimoto does not teach measuring a thermal conductivity of the closed-celled water-foamed polyurethane within the container 1. Rather, Kishimoto teaches that, after the container is sealed, the thermal insulation characteristic of the obtained thermal insulator is measured. As disclosed in Kishimoto, the "thermal insulator" is the entire structure depicted in Fig. 1, including the container. Thus, Kishimoto does not teach covering exposed sides of the structure whose thermal conductivity is measured.

The other references are not applied in a manner to overcome these shortfalls in the application of Kishimoto to the subject matter of claim 18.

2. **It Would Not Have Been Obvious to One of Ordinary Skill in the Art to Have Modified Kishimoto Based on the Alleged Teachings of Amer**

As indicated above, Amer is directed to a method for measuring the thermal conductivity of thin films between 50 μm and 150 μm thick. Amer itself distinguishes its invention from devices marketed to measure thicker specimens ($> 6.25\text{ mm}$), such as insulations. Kishimoto is directed to a thermal insulator including a foam containing solidified CO_2 gas, encased in a container, such as may be used in a refrigerator, a freezer, and the like. Kishimoto does not disclose a specific thickness of the insulator.

Based on the disclosures of the references, taken as a whole, one of ordinary skill in the art would not have applied the measuring method of Amer to the Kishimoto device with a reasonable expectation of success. The thermal insulator of Kishimoto, including a foamed plastic encased in a container, does not reasonably correspond to the thin films, such as paints, used in Amer. The specifically relied-upon features of Amer, regarding application of contact pressure between the slabs and the specimen, heating of a slab, and application of the thin layer of thermal grease between the specimen and the slabs, are all discussed in Amer in the context of measuring thin films. There is no objective evidence of record to reasonably suggest that such features would have logically commended themselves to one of ordinary skill in the art looking to measure a thermal conductivity of a thermal insulator such as disclosed in Kishimoto.

Accordingly, it would not have been obvious to one of ordinary skill in the art to modify Kishimoto in the specific manner suggested by the Office Action based on the disparate teachings of Amer.

3. **The Present Subject Matter Provides Unexpected Benefits over the Applied References**

As detailed in Appellants' disclosure, the present subject matter provides a method by which thermal conductivity of a honeycomb structure may be measured without preparing a test specimen. The applied references do not suggest the solution arrived at by the subject matter of the pending claims. At best, one of ordinary skill in the art looking to Amer might have thought that the preparation of a thin-film specimen from the honeycomb structure would be necessary, assuming such a use would even be possible, which Appellants do not concede. Testing the Kishimoto structures using the Amer method would thus at least require damaging the Kishimoto structure to prepare a specimen having a thickness of 50µm-150µm. However, there is no suggestion in Amer or Kishimoto that such a thin film specimen can be obtained from the Kishimoto structure.

Additionally, any such attempts would still fall short of the subject matter of claim 18 regarding at least covering exposed sides of the honeycomb structure with heat-insulating material, and keeping the whole honeycomb structure in a steady temperature state with keeping two ends of the honeycomb structure at given different temperatures.

B. **Claim 25 Would Not Have Been Obvious over the Applied References**

The Examiner's Answer concedes that Kishimoto and Amer do not teach wherein the honeycomb structure contains at least one kind selected from the group consisting of silicon carbide, a compositive silicon carbide and metallic silicon, and silicon nitride. The Examiner's Answer relies on U.S. Patent No. 6,730,421 to Kirino et al. (hereinafter "Kirino") to remedy the shortfall. The Examiner asserts, in conclusory manner, that it would have been obvious to one of ordinary skill in the art to have made the structure disclosed by Kishimoto of silicon nitride "so as the allow the operator to test a thermally conductive honeycomb structure made of silicon nitride material because this material has its own thermal

conductivity which is important factor when a honeycomb structure is being used as, for example, a thermal interface device, in order to know the thermal conductivity of the interface device or heat sink device, and thus, to prevent an object of interest from overheating, by using a known material on the basis of its suitability for the intended use of the invention." The Examiner offers no objective evidence, or other sanctioned underpinning, in support of this sweeping assertion.

A "key to supporting any rejection under 35 U.S.C. §103(a) is the clear articulation of the reason(s) why the claimed invention would have been obvious" (MPEP §2143). In *KSR International Co. v. Teleflex Inc.*, 127 S.Ct. 1727, 1741 (2007) (hereinafter *KSR*), the Supreme Court noted that the analysis supporting a rejection under 35 U.S.C. §103(a) should be made explicit (MPEP §2143). In this regard, the Federal Circuit also recently reaffirmed its prior holdings asserting that "rejections on obviousness grounds cannot be sustained by mere conclusory statement; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006). As stated by the Supreme Court in *KSR*, "a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art." *KSR*, 127 S.Ct. at 1741. The conclusory statement of the Examiner's Answer does not meet these standards, and fails to establish, or explain, why it allegedly would have been obvious to modify the thermal insulator disclosed in Kishimoto to include silicon nitride.

Kirino is directed to a magnetic recording medium. It is unclear, at best, from the Examiner's Answer how any specific disclosure of Kirino would have logically commended itself to one of ordinary skill in the art looking to modify Kishimoto, which is directed to a thermal insulator, including a foam containing solidified CO₂ gas. Rather, the conclusion of

the Examiner's Answer appears to be based solely on hindsight reconstruction using Appellants' disclosure as a template for combining the disparate teachings of these references.

C. Conclusion

For all the reasons discussed above, it is respectfully submitted that the rejections are in error and that claims 13, 16-18, 22, 24 and 25 are in condition for allowance. For all of the above reasons, Appellants respectfully request this Honorable Board to reverse the rejections of claims 13, 16-18, 22, 24 and 25.

Respectfully submitted,



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